WHAT IS CLAIMED IS:

1. A sheet feeding apparatus which feeds sheet media in between a feed roller and a reverse roller, that is a roller pressed into contact with said feed roller, is provided by being elastically supported upward by a free end of a cantilever shaft integrally rotating with a driven gear engaging a drive gear and through a torque limiter, and is rotated in a sheet feeding direction or its reverse direction; and which separates and conveys said sheet media held between said feed roller and said reverse roller one by one by utilizing differences in friction coefficients between said feed roller, said reverse roller, and said sheet media, wherein

a pressurizing force of said reverse roller against said feed roller is periodically changed by utilizing changes in the moment of said cantilever shaft based on periodical shifting of an engagement position between said driving gear and said driven gear in a longitudinal direction of the shafts supporting these gears.

2. A sheet feeding apparatus which feeds sheet media in between a feed roller and a reverse roller, that is a roller pressed into contact with said feed roller, is provided by being elastically supported upward by a free end of a cantilever shaft integrally rotating with a driven gear

engaging a drive gear and through a torque limiter, and is rotated in a sheet feeding direction or its reverse direction; and which separates and conveys said sheet media held between said feed roller and said reverse roller one by one by utilizing differences in friction coefficients between said feed roller, said reverse roller, and said sheet media, said sheet feeding apparatus further comprising

a length variable unit having a variable length, based on such conditions that a position of said engagement part and a rotational direction of said driving gear are determined so that the teeth surfaces of said driven gear undergo an upward force of the pressurizing force by said driving gear based on said engagement part as an action point of force, and the pressurizing force of said reverse roller against said feed roller is periodically changed by varying said length from a fulcrum, that is a cantilever supporting part of said cantilever shaft, to the action point of the force.

3. The sheet feeding apparatus according to claim 2, wherein said length variable unit is integrally formed with said driving gear or said driven gear.

4. The sheet feeding apparatus according to claim 3, wherein said length variable unit comprises a group of driving gears formed with a plurality of gears arranged at intervals on a driving gear supporting shaft that supports said driving gear; and a group of driven gears formed with a plurality of gears arranged at intervals on a driven gear supporting shaft that supports said driven gear, and

each gear forming either one of these groups of driving gears and driven gears is a teeth-omitted gear that has a teeth-omitted portion, where teeth are omitted, on its circumference, and teeth-omitted gears are arranged so that teeth-omitted portions are complemented by each other.

5. The sheet feeding apparatus according to claim 4, wherein one gear has a plurality portions of said teeth-omitted portion.

6. The sheet feeding apparatus according to claim 4, wherein a tooth Y next to a teeth-omitted portion in one of said teeth-omitted gears and a tooth Z at a position of the nearest phase to said tooth Y of teeth next to teeth-omitted portions in another teeth-omitted gear are simultaneously engaged with respective opposite gears.

7. The sheet feeding apparatus according to claim 4, wherein a plurality of teeth-omitted gears forming said group of gears are integrally formed.

8. The sheet feeding apparatus according to claim 3, wherein said length variable unit comprises an another driving gear arranged on a driving gear supporting shaft that supports said driving gear; and an another driven gear arranged on a driven gear supporting shaft that supports said driven gear, and

said another driving gear and another driven gear have the same length on said respective supporting shafts, and one of which is a gear with teeth being aligned at its one end in a direction of its tooth width on its pitch circle, and with teeth having different tooth widths at the other end in the direction of the tooth width in which said tooth width becomes gradually wider and gradually narrower during one round from a given position on said pitch circle.

9. The sheet feeding apparatus according to claim 8, wherein, when it is assumed that a gear having a tooth width in a longitudinal direction of said supporting shaft and being cylindrical in its outline is cut along one virtual plane intersecting said supporting shaft at an acute angle, said gear with different tooth widths is a gear with an

inclined plane formed with one given gear as a main element of the two gears divided through the cutting.

10. The sheet feeding apparatus according to claim 3, wherein said length variable unit comprises an another driving gear arranged on a driving gear supporting shaft that supports said driving gear; and an another driven gear arranged on a driven gear supporting shaft that supports said driven gear, and

one of said another driving gear and driven gear is a gear with a constant tooth width in which each tooth on a pitch circle is displaced from one another on the supporting shaft in its longitudinal direction while the tooth width on said pitch circle is kept constant.

11. The sheet feeding apparatus according to claim 10, wherein, when it is assumed that a gear having a tooth width in a longitudinal direction of a supporting shaft and being cylindrical in its outline is cut along two virtual planes in parallel each intersecting said supporting shaft at an acute angle, said gear with a constant tooth width is formed with a slantingly-sliced-like gear, as a main element, having a shape of a gear sandwiched by said two virtual planes of the three gears divided through the cutting.

12. The sheet feeding apparatus according to claim 2, wherein said length variable unit has a shifting unit, as its main element, that slides said driving gear or said driven gear along a supporting shaft that supports either one of said gears in a longitudinal direction of said supporting shaft.

13. The sheet feeding apparatus according to claim 12, wherein said driving gear is slid integrally with said supporting shaft in a longitudinal direction of said supporting shaft, wherein said shifting unit includes

a biasing unit that biases said supporting shaft in its longitudinal direction;

a disk cam disposed at a position preventing movement of said supporting shaft by said biasing unit; and

a driving unit that applies a rotational driving force to said supporting shaft.

14. The sheet feeding apparatus according to claim 13, wherein said driving unit comprises a driven-side gear fixed to said supporting shaft and a driving-side gear that engages said driven-side gear.

15. The sheet feeding apparatus according to claim 12, wherein a gear to be slid along the longitudinal direction of said supporting shaft is said driving gear, and said driving gear is slidably mounted on said supporting shaft in its longitudinal direction through a rotation preventing unit, wherein said shifting unit further includes

a holding member that can reciprocate in a state of holding said driving gear based on restriction of its shifting direction to a longitudinal direction of said supporting shaft; and

a reciprocating unit that reciprocates said holding member in the longitudinal direction of said supporting shaft.

16. The sheet feeding apparatus according to claim 15, wherein said reciprocating unit is structured with a groove formed on said holding member and having a length in a direction perpendicular to said longitudinal direction; a projection part engaged with this groove; and a circular motion unit that provides circular motion to this projection part.

17. An image formation apparatus comprising:

a sheet feeding apparatus which feeds sheet media; and an image forming unit which forms an image on the sheet

media feed by said sheet feeding apparatus,

wherein said sheet feeding apparatus feeds the sheet media in between a feed roller and a reverse roller, that is a roller pressed into contact with said feed roller, is provided by being elastically supported upward by a free end of a cantilever shaft integrally rotating with a driven gear engaging a drive gear and through a torque limiter, and is rotated in a sheet feeding direction or its reverse direction; and which separates and conveys said sheet media held between said feed roller and said reverse roller one by one by utilizing differences in friction coefficients between said feed roller, said reverse roller, and said sheet media, and

wherein a pressurizing force of said reverse roller against said feed roller is periodically changed by utilizing changes in the moment of said cantilever shaft based on periodical shifting of an engagement position between said driving gear and said driven gear in a longitudinal direction of the shafts supporting these gears.

18. An image formation apparatus comprising:

a sheet feeding apparatus which feeds sheet media; and an image forming unit which forms an image on the sheet media feed by said sheet feeding apparatus,

wherein said sheet feeding apparatus feeds sheet media

in between a feed roller and a reverse roller, that is a roller pressed into contact with said feed roller, is provided by being elastically supported upward by a free end of a cantilever shaft integrally rotating with a driven gear engaging a drive gear and through a torque limiter, and is rotated in a sheet feeding direction or its reverse direction; and which separates and conveys said sheet media held between said feed roller and said reverse roller one by one by utilizing differences in friction coefficients between said feed roller, said reverse roller, and said sheet media, said sheet feeding apparatus further including

a length variable unit having a variable length, based on such conditions that a position of said engagement part and a rotational direction of said driving gear are determined so that the teeth surfaces of said driven gear undergo an upward force of the pressurizing force by said driving gear based on said engagement part as an action point of force, and the pressurizing force of said reverse roller against said feed roller is periodically changed by varying said length from a fulcrum, that is a cantilever supporting part of said cantilever shaft, to the action point of the force.

19. A manufacturing method of gears with an inclined plane to be used in a sheet feeding apparatus which feeds sheet media in between a feed roller and a reverse roller, that is a roller pressed into contact with said feed roller, is provided by being elastically supported upward by a free end of a cantilever shaft integrally rotating with a driven gear engaging a drive gear and through a torque limiter, and is rotated in a sheet feeding direction or its reverse direction; and which separates and conveys said sheet media held between said feed roller and said reverse roller one by one by utilizing differences in friction coefficients between said feed roller, said reverse roller, and said sheet media, said sheet feeding apparatus further including

a length variable unit having a variable length, based on such conditions that a position of said engagement part and a rotational direction of said driving gear are determined so that the teeth surfaces of said driven gear undergo an upward force of the pressurizing force by said driving gear based on said engagement part as an action point of force, and the pressurizing force of said reverse roller against said feed roller is periodically changed by varying said length from a fulcrum, that is a cantilever supporting part of said cantilever shaft, to the action point of the force,

wherein said length variable unit is integrally formed

with said driving gear or said driven gear,

wherein said length variable unit comprises an another driving gear arranged on a driving gear supporting shaft that supports said driving gear; and an another driven gear arranged on a driven gear supporting shaft that supports said driven gear, and said another driving gear and another driven gear have the same length on said respective supporting shafts, and one of which is a gear with teeth being aligned at its one end in a direction of its tooth width on its pitch circle, and with teeth having different tooth widths at the other end in the direction of the tooth width in which said tooth width becomes gradually wider and gradually narrower during one round from a given position on said pitch circle,

wherein, when it is assumed that a gear having a tooth width in a longitudinal direction of said supporting shaft and being cylindrical in its outline is cut along one virtual plane intersecting said supporting shaft at an acute angle, said gear with different tooth widths is a gear with an inclined plane formed with one given gear as a main element of the two gears divided through the cutting,

wherein said gears are manufactured through injection molding using a mold whose dividing plane is said virtual plane, and whose divided parts are moved in the longitudinal direction of said supporting shaft to be opened and closed.

20. A manufacturing method of slantingly-sliced-like gears to be used in a sheet feeding apparatus which feeds sheet media in between a feed roller and a reverse roller, that is a roller pressed into contact with said feed roller, is provided by being elastically supported upward by a free end of a cantilever shaft integrally rotating with a driven gear engaging a drive gear and through a torque limiter, and is rotated in a sheet feeding direction or its reverse direction; and which separates and conveys said sheet media held between said feed roller and said reverse roller one by one by utilizing differences in friction coefficients between said feed roller, said reverse roller, and said sheet media, said sheet feeding apparatus further including

a length variable unit having a variable length, based on such conditions that a position of said engagement part and a rotational direction of said driving gear are determined so that the teeth surfaces of said driven gear undergo an upward force of the pressurizing force by said driving gear based on said engagement part as an action point of force, and the pressurizing force of said reverse roller against said feed roller is periodically changed by varying said length from a fulcrum, that is a cantilever supporting part of said cantilever shaft, to the action point of the force,

wherein said length variable unit is integrally formed

with said driving gear or said driven gear,

wherein said length variable unit comprises an another driving gear arranged on a driving gear supporting shaft that supports said driving gear; and an another driven gear arranged on a driven gear supporting shaft that supports said driven gear, and one of said another driving gear and driven gear is a gear with a constant tooth width in which each tooth on a pitch circle is displaced from one another on the supporting shaft in its longitudinal direction while the tooth width on said pitch circle is kept constant,

wherein, when it is assumed that a gear having a tooth width in a longitudinal direction of a supporting shaft and being cylindrical in its outline is cut along two virtual planes in parallel each intersecting said supporting shaft at an acute angle, said gear with a constant tooth width is formed with a slantingly-sliced-like gear, as a main element, having a shape of a gear sandwiched by said two virtual planes of the three gears divided through the cutting,

wherein said gears are manufactured through injection molding using a mold whose dividing plane is said virtual plane, and whose divided parts are moved in the longitudinal direction of said supporting shaft to be opened and closed.

21. A sheet feeding method comprising the steps of feeding sheet media in between a feed roller and a reverse roller, that is a roller pressed into contact with said feed roller, is provided by being elastically supported upward by a free end of a cantilever shaft integrally rotating with a driven gear engaging a drive gear and through a torque limiter, and is rotated in a sheet feeding direction or its reverse direction; and separating and conveying said sheet media held between said feed roller and said reverse roller one by one by utilizing differences in friction coefficients between said feed roller, said reverse roller, and said sheet media,

said sheet feeding method using a length variable unit with a motor as a driving power source to vary a length, based on such conditions that a pressurizing force of said reverse roller against said feed roller is periodically changed with no stage or with a plurality of stages,

a position of said engagement part and a rotational direction of said driving gear are determined so that the teeth surfaces of said driven gear undergo an upward force of the pressurizing force by said driving gear based on said engagement part as an action point, and the pressurizing force is changed by varying said length from a fulcrum, that is a cantilever supporting part of said cantilever shaft, to the action point of the force, and

said sheet feeding method further comprising the step of controlling operation or non-operation of said length variable unit according to a switching operation.

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